CLAIMS

I Claim:

1. 1. A method of any speed dubbing using isochronous data packets comprising:
2.   a. configuring a transmitting plug on a transmitting device for transmitting
3.   isochronous data packets in non real-time;
4.   b. configuring a receiving plug on a receiving device for receiving the isochronous
5.   data packets received in non real-time;
6.   c. packetizing a data stream into the isochronous data packets configured for non
7.   real-time transmission, thereby forming a stream of non real-time isochronous
8.   data packets; and
9.   d. transmitting the non real-time isochronous data packets from the transmitting
10.   device via the transmitting plug to the receiving device via the receiving plug.

1. 2. The method according to Claim 1 wherein the stream of non real-time isochronous data
2. packets is formed by packetizing the data stream into real-time isochronous data packets
3. and encapsulating one or more real-time isochronous data packets within a non real-time
4. header to form each non real-time isochronous data packet within the stream of non real-
5. time isochronous data packets, further wherein the number of real-time isochronous data
6. packets encapsulated within each non real-time isochronous data packet is associated
7. with a non real-time transmission speed of the stream of non real-time isochronous data
8. packets.

1. 3. The method according to Claim 2 wherein if the non real-time transmission speed is
2. greater than real-time, then the non-real time transmission speed is a multiple of the real-
3. time transmission speed and the number of real-time isochronous data packets

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4   encapsulated within each non real-time isochronous data packet corresponds to the

5   multiple.

1   4.   The method according to Claim 2 wherein if the non real-time transmission speed is less

2   than real-time then a single real-time isochronous data packet is encapsulated within each

3   non real-time isochronous data packet such that only a portion of the data originally

4   contained within the single real-time isochronous data packet is included within the

5   encapsulated non real-time isochronous data packet, and a remaining portion of the data

6   originally contained within the single real-time isochronous data packet is encapsulated in

7   one or more subsequent non real-time isochronous data packets.

1   5.   The method according to Claim 2 wherein the non real-time header includes a non real-

2   time isochronous header and a non real-time CIP header.

1   6.   The method according to Claim 5 wherein the non real-time isochronous header includes

2   a data length field for indicating the amount of data contained within the non real-time

3   isochronous data packet.

1   7.   The method as claimed in Claim 5 wherein the non real-time CIP header includes a

2   format field for indicating that the non real-time isochronous data packet is formatted for

3   non real-time data transfer.

1   8.   The method according to Claim 1 wherein the data stream includes audio/visual content

2   data.

1   9.   The method according to Claim 1 wherein the non real-time isochronous data packets are

2   transmitted in non real-time over an isochronous channel.

1   10.   The method according to claim 1 wherein the non real-time isochronous data packets are

2   transmitted in non real-time over an asynchronous stream.

1   11.   A method of transmitting isochronous data packets in non real-time comprising:

2   a.   configuring a source plug of a source device for transmitting isochronous data

3   packets in non real-time;

4   b.   packetizing a data stream into real-time isochronous data packets;

5   c.   determining a transmission speed of the isochronous data packets to be

6   transmitted;

7   d.   encapsulating a selective one of a partial real-time isochronous data packet and

8   multiple real-time isochronous data packets within a non real-time isochronous

9   data packet, wherein a number of encapsulated real-time isochronous data packets

10   is based on the transmission speed; and

11   e.   transmitting the non real-time isochronous data packets via the source plug.

1   12.   The method according to Claim 11 wherein if the transmission speed is greater than real-

2   time, then multiple real-time isochronous data packets are encapsulated within the non

3   real-time isochronous data packet.

1   13.   The method according to Claim 11 wherein if the transmission speed is less than real-

2   time, then a partial real-time isochronous data packet is encapsulated within the non real-

3   time isochronous data packet and a remaining portion of the real-time isochronous data

4   packet is encapsulated in one or more subsequent non real-time isochronous data packets.

1   14.   The method according to Claim 11 wherein each non real-time isochronous data packet

2   includes a non real-time isochronous header and a non real-time CIP header.

1   15.   The method according to Claim 14 wherein the non real-time isochronous header

2   includes a data length field for indicating the amount of data contained within the non

3   real-time isochronous data packet.

1   16.   The method as claimed in Claim 14 wherein the non real-time CIP header includes a

2   format field for indicating that the non real-time isochronous data packet is formatted for

3   non real-time data transfer.

1   17.   The method according to Claim 11 wherein the data stream includes audio/visual content

2   data.

1   18.   The method according to Claim 11 wherein the non real-time isochronous data packets

2   are transmitted in non real-time over an isochronous channel.

1   19.   The method according to claim 11 wherein the non real-time isochronous data packets are

2   transmitted in non real-time over an asynchronous stream.

1   20.   A method of receiving isochronous data packets in non real-time comprising:

2   a.   configuring a destination plug of a destination device for receiving isochronous

3   data packets in non real-time;

4   b.   receiving isochronous data packets over the destination plug;

5   c.   determining a format of the received isochronous data packets;

6   d.   if the format indicates that the received isochronous data packets are non real-time

7   isochronous data packets, then determining a transmission speed of the non real-

8   time isochronous data packets;

9   e.   isolating a selective one of a partial real-time isochronous data packet and

10   multiple real-time isochronous data packets encapsulated within the non real-time

11   isochronous data packet, wherein a number of real-time isochronous data packets

12   is based upon the transmission speed; and

13   f.   processing the real-time isochronous data packets.

1   21.   The method according to Claim 20 wherein if a partial real-time isochronous data packet

2   is encapsulated within the non real-time isochronous data packet, then a remaining

3   portion of the real-time isochronous data packet is encapsulated in one or more

4   subsequent non real-time isochronous data packets, and the remaining portion is collected

5   and aggregated with the partial real-time isochronous data packet before processing.

1   22.   The method according to Claim 20 wherein each non real-time isochronous data packet

2   includes a non real-time isochronous header and a non real-time CIP header.

1   23.   The method according to Claim 22 wherein the non real-time isochronous header

2   includes a data length field for indicating the amount of data contained within the non

3   real-time isochronous data packet.

1   24.   The method as claimed in Claim 22 wherein the non real-time CIP header includes a

2   format field for indicating that the non real-time isochronous data packet is formatted for

3   non real-time data transfer.

1   25.   The method according to Claim 20 wherein the data stream includes audio/visual content

2   data.

1   26.   A method of configuring a plug to support non real-time streams of isochronous data

2   packets comprising:

3   a.   embedding a non real-time plug transfer information block within a plug

4   configuration information block;

5   b.   defining a non real-time information type within the non real-time plug transfer

6   information block, wherein the non real-time information type indicates a non

7   real-time stream of isochronous data packets;

8   c.   setting a bandwidth value within the non real-time plug transfer information block

9   corresponding to a bus bandwidth of the non real-time stream of isochronous data

10   packets; and

11   d.   setting an enable field within the non real-time plug transfer information block to

12   enable the plug to support non real-time streams of isochronous data packets.

1   27.   An apparatus for communicating isochronous data packets in non real-time comprising:

2   a.   a configuring circuit to configure a plug to communicate isochronous data packets

3   in non real-time;

4   b.   a packetizing circuit to packetize a data stream into isochronous data packets

5   configured for non real-time transmission, thereby forming a stream of non real-

6   time isochronous data packets;

7   c.   a transceiver circuit configured to communicate isochronous data packets in non

8   real-time via the plug;

9   d.   a de-packetizing circuit to extract one or more real-time isochronous data packets

10   encapsulated within each non real-time isochronous data packet; and

11   e.   a controller coupled to the configuring circuit, the packetizing circuit, the

12   transceiver circuit, and the de-packetizing circuit, wherein the controller processes

13   the extracted real-time isochronous data packets.

1   28.   The apparatus according to Claim 27 wherein the stream of non real-time isochronous

2   data packets is formed by packetizing the data stream into real-time isochronous data

3 packets and encapsulating one or more real-time isochronous data packets within a non

4 real-time header to form each non real-time isochronous data packet within the stream of

5 non real-time isochronous data packets, further wherein the number of real-time

6 isochronous data packets encapsulated within each non real-time isochronous data packet

7 is associated with a non real-time transmission speed of the stream of non real-time

8 isochronous data packets.

1 29. The apparatus according to Claim 28 wherein if the non real-time transmission speed is

2 greater than real-time, then the non-real time transmission speed is a multiple of the real-

3 time transmission speed and the number of real-time isochronous data packets

4 encapsulated within each non real-time isochronous data packet corresponds to the

5 multiple.

1 30. The apparatus according to Claim 28 wherein if the non real-time transmission speed is

2 less than real-time then a single real-time isochronous data packet is encapsulated within

3 each non real-time isochronous data packet such that only a portion of the data originally

4 contained within the single real-time isochronous data packet is included within the

5 encapsulated non real-time isochronous data packet, and a remaining portion of the data

6 originally contained within the single real-time isochronous data packet is encapsulated in

7 one or more subsequent non real-time isochronous data packets.

1 31. The apparatus according to Claim 28 wherein the non real-time header includes a non

2 real-time isochronous header and a non real-time CIP header.

1 32. The apparatus according to Claim 31 wherein the non real-time isochronous header

2 includes a data length field for indicating the amount of data contained within the non

3 real-time isochronous data packet.

1   33.   The apparatus as claimed in Claim 31 wherein the non real-time CIP header includes a

2   format field for indicating that the non real-time isochronous data packet is formatted for

3   non real-time data transfer.

1   34.   The apparatus according to Claim 27 wherein the data stream includes audio/visual

2   content data.

1   35.   The apparatus according to Claim 27 wherein the non real-time isochronous data packets

2   are transmitted in non real-time over an isochronous channel.

1   36.   The apparatus according to claim 27 wherein the non real-time isochronous data packets

2   are transmitted in non real-time over an asynchronous stream.

1   37.   The apparatus according to claim 27 wherein if a partial real-time isochronous data

2   packet is encapsulated within the non real-time isochronous data packet, then a remaining

3   portion of the real-time isochronous data packet is encapsulated in one or more

4   subsequent non real-time isochronous data packets, and the remaining portion is collected

5   and aggregated with the partial real-time isochronous data packet before processing.

1   38.   The apparatus according to claim 27 wherein the transceiver circuit is configured to

2   transmit isochronous data packets in non real-time via the plug.

1   39.   The apparatus according to claim 27 wherein the transceiver circuit is configured to

2   receive isochronous data packets in non real-time via the plug.

1   40.   An apparatus for communicating isochronous data packets in non real-time comprising:

2   a.   means for configuring a plug to communicate isochronous data packets in non

3   real-time;

4   b.   means for packetizing a data stream into isochronous data packets configured for

5   non real-time transmission, thereby forming a stream of non real-time isochronous

6   data packets;

7   c.   means for communicating isochronous data packets in non real-time via the plug;

8   d.   means for extracting one or more real-time isochronous data packets encapsulated

9   within each non real-time isochronous data packet, wherein a number of real-time

10   isochronous data packets is based upon the transmission speed; and

11   e.   means for controlling coupled to the means for configuring, the means for

12   packetizing, the means for communicating, and the means for de-packetizing,

13   wherein the means for controlling processes the extracted real-time isochronous

14   data packets.

1   41.   The apparatus according to Claim 40 wherein the stream of non real-time isochronous

2   data packets is formed by packetizing the data stream into real-time isochronous data

3   packets and encapsulating one or more real-time isochronous data packets within a non

4   real-time header to form each non real-time isochronous data packet within the stream of

5   non real-time isochronous data packets, further wherein the number of real-time

6   isochronous data packets encapsulated within each non real-time isochronous data packet

7   is associated with a non real-time transmission speed of the stream of non real-time

8   isochronous data packets.

1   42.   The apparatus according to Claim 41 wherein if the non real-time transmission speed is

2   greater than real-time, then the non-real time transmission speed is a multiple of the real-

3   time transmission speed and the number of real-time isochronous data packets

4   encapsulated within each non real-time isochronous data packet corresponds to the

5   multiple.

1   43.   The apparatus according to Claim 41 wherein if the non real-time transmission speed is
2   less than real-time then a single real-time isochronous data packet is encapsulated within
3   each non real-time isochronous data packet such that only a portion of the data originally
4   contained within the single real-time isochronous data packet is included within the
5   encapsulated non real-time isochronous data packet, and a remaining portion of the data
6   originally contained within the single real-time isochronous data packet is encapsulated in
7   one or more subsequent non real-time isochronous data packets.

1   44.   The apparatus according to Claim 41 wherein the non real-time header includes a non
2   real-time isochronous header and a non real-time CIP header.

1   45.   The apparatus according to Claim 44 wherein the non real-time isochronous header
2   includes a data length field for indicating the amount of data contained within the non
3   real-time isochronous data packet.

1   46.   The apparatus as claimed in Claim 44 wherein the non real-time CIP header includes a
2   format field for indicating that the non real-time isochronous data packet is formatted for
3   non real-time data transfer.

1   47.   The apparatus according to Claim 40 wherein the data stream includes audio/visual
2   content data.

1   48.   The apparatus according to Claim 40 wherein the non real-time isochronous data packets
2   are transmitted in non real-time over an isochronous channel.

1   49.   The apparatus according to claim 40 wherein the non real-time isochronous data packets

2   are transmitted in non real-time over an asynchronous stream.

1   50.   The apparatus according to claim 40 wherein if a partial real-time isochronous data

2   packet is encapsulated within the non real-time isochronous data packet, then a remaining

3   portion of the real-time isochronous data packet is encapsulated in one or more

4   subsequent non real-time isochronous data packets, and the remaining portion is collected

5   and aggregated with the partial real-time isochronous data packet before processing.

1   51.   The apparatus according to claim 40 wherein the means for communicating is configured

2   to transmit isochronous data packets in non real-time via the plug.

1   52.   The apparatus according to claim 40 wherein the means for communicating is configured

2   to receive isochronous data packets in non real-time via the plug.